WHAT IS CLAIMED IS:

1. A method for inspecting an object and detecting defects, said method comprising:

injecting a heat pulse by light beam at a selected point on said object;

capturing a sequence of consecutive thermal images of said object to record heat diffusion over time resulting from said heat pulse;

comparing said heat diffusion over time at said point on said object to a reference; and

determining whether said object comprises any defects.

2. A method as claimed in claim 1, wherein said injecting a pulse by light beam comprises directing heat to a bottom surface of said object, said heat transmitting through a top surface of said object.

3. A method as claimed in claim 1, wherein said capturing a sequence of consecutive thermal images comprises capturing a first image prior to said injecting a heat pulse.

4. A method as claimed in claim 3, wherein comparing further comprises subtracting data of said first image from data of subsequent images taken after said injecting a heat pulse in order to remove ambient and variation effects.

5. A method as claimed in claim 1, wherein said step of comparing said heat diffusion over time at said point on said object to a reference comprises comparing an area of interest surrounding said point on a sequence of images to an area of interest surrounding said point on a sequence of reference images.

6. A method as claimed in claim 5, wherein said reference images are the average of a plurality of images of known defect-free objects.

7. A method as claimed in claim 1, further comprising the steps of:

holding said object in place, ensuring a precise positioning in space;

maintaining said object at a stable temperature;

programming an entire set of points on said object to be inspected;

injecting a heat pulse by light beam at a next point on said object, said next point determined by said set of points;

repeating said step of injecting a heat pulse by light beam at a next point on said object until all points in said entire set of points have been inspected;

providing a compilation of results to produce a complete analysis after said entire set of points on said object has been inspected.

8. A method as claimed in claim 7, further comprising the step of waiting for temperature of at least one of said object and an area to be inspected to return to an ambient temperature before said repeating said step of injecting a heat pulse by light beam.

9. A method as claimed in claim 1, wherein said light beam is collimated, redirected, and modified to provide maximum heat power without damaging said object's surface.

10. A method as claimed in any one of claims 1 to 9, wherein said object is a populated board.

11. A method as claimed in claim 10, wherein ball-grid arrays are mounted on said populated board and said defects to be detected are the quality and integrity of solder junctions between said populated board and said ball-grid arrays.

12. A method as claimed in claim 10, wherein flip chips are mounted on said populated board and said defects to be detected are the quality and integrity of connections between said flip chips and said populated board.

13. A method as claimed in claim 11, wherein each said heat pulse is directed to a point beneath a solder joint that will allow the maximum amount of injected heat to reach said solder joint.

14. A method as claimed in claim 13, wherein each point in said set of points corresponds to a ball in a ball-grid array.

15. A method as claimed in claim 7, wherein said object is a populated board and said populated board is held in a precise position in space by mounting said populated board onto register pins.

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16. A method as claimed in claim 1, wherein an energy of said heat pulse is varied depending on a position within said populated board in order to optimize imaging of said heat diffusion.

17. An apparatus for inspecting an object and detecting defects, said apparatus comprising:

a mounting for mounting said object;

a pulsed laser source having a beam able to be positioned for providing a heat pulse at a precise location on said object;

a thermal camera for capturing thermal images of said object;

a frame grabber for capturing a sequence of image signals from said thermal camera;

a memory unit for storing data representative of heat diffusion over time resulting from said heat pulse obtained from said sequence of image signals; and

an analyzing unit for comparing said heat diffusion data to a reference data set, said reference comprising upper and lower limits of acceptable thermal heat diffusions of a specific area on said object.

18. An apparatus as claimed in claim 17, further comprising an X-Y galvanometer to align said pulsed laser source with said precise location on said object.

19. An apparatus as claimed in claim 18, further comprising a controller programming an entire sequence of points on said object and causing said X-Y galvanometer to sequentially target each point of said sequence of points.

20. An apparatus as claimed in claim 18, further comprising

focusing optics for converging, diverging, and deflecting said pulsed laser source;

an optical power attenuator to adjust power of said heat pulse; and

an input/output interface to control said X-Y galvanometer, said pulsed laser source, and said optical power attenuator.

21. An apparatus as claimed in claim 17, wherein said mounting means further comprises register pins.

22. An apparatus as claimed in claim 17, wherein said mounting comprises a stage allowing said object to be moved in the x and y direction.

23. An apparatus as claimed in claim 22, wherein said mounting can also move in the z direction.

24. An apparatus as claimed in claim 22, further comprising a controller programming an entire sequence of points on said object and causing said mounting to align sequentially each point of said sequence of points on said object to said pulsed laser source.